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Effectiveness of Research-Oriented Integrated Nursing Interventions on Cancer Pain Management in Chinese Hospitalized Oncology Patients: A Meta-Analysis

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Abstract: Objective: To systematically evaluate the effectiveness of research-oriented integrated nursing interventions on cancer pain management in hospitalized oncology patients in China. **Methods:** A computerized search of Chinese and English databases was conducted to identify relevant studies. Two researchers independently assessed the quality of included literature using the Newcastle-Ottawa Scale (NOS). Data were extracted and analyzed via Stata 14. A random-effects model was applied due to significant heterogeneity ($I^2 > 50\%$). Sensitivity analysis and Egger's test were performed to assess bias. **Results:** 12 eligible studies (2014–2024) were included. Meta-analysis demonstrated that integrated nursing interventions significantly reduced cancer pain scores compared to routine care (SMD = -1.51, 95% CI: -1.90 to -1.12; I^2= 84.8%), with superior efficacy. Subgroup-analyses revealed enhanced effects for "Nursing modes" (SMD = -2.11) and "cancer pain education" (SMD = -2.30). **Conclusion:** Research-oriented integrated nursing interventions significantly improve cancer pain management in Chinese hospitalized oncology patients, particularly through synergistic effects of "Nursing modes" and "cancer pain education." However, implementation bias from "additive interventions" in teaching hospitals and high heterogeneity warrant attention. Future studies should optimize designs to enhance clinical applicability.

Keywords: Meta-Analysis; Hospitalized Oncology Patient; Cancer Pain Management; Nursing Intervention

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1.Introduction

In the medical and health industry, the objective demands of nursing research have contributed to the rapid development of clinical nursing academic research, providing fertile ground for the exponential growth of nursing research. With the development of the discipline and the vigorous momentum of scientifi c research, the literature on clinical intervention in nursing often shows a tendency of "research orientation", and the utilitarian theory of scientifi c research and the theory of positive supremacy increasingly occupy the academic publishing market. "Research-oriented Integrated Nursing Intervention" refers to the integration of multidisciplinary resources and diverse nursing measures (such as medication, psychology, rehabilitation, etc.) within the framework of clinical Research. And an intervention model that is dynamically adjusted according to the individual needs of patients. In the fi eld of cancer pain management, physical pain and the stress brought by pain constantly trouble cancer patients and are also topics that the academic community has never fully explored. This study aims to

systematically evaluate the effectiveness of research-oriented comprehensive nursing intervention in cancer pain management for inpatients with tumors in China through meta-analysis technology, with the expectation of expanding new horizons for clinical nursing research.·

2.Methods

2.1 Literature Retrieval Strategy

7 databases, namely Pubmed, Science Direct, China National Knowledge Infrastructure (CNKI), Wanfang Journal Database, Cochrane Library and Embase, were retrieved by computer. The study adopted a systematic retrieval strategy of "subject terms + free terms", and the retrieval period was from the establishment of the databases to January 29, 2025..The search terms in the English characters are "cancer patients/hospitalization cancer patients" and "cancer pain/cancer pain management/cancer breakthrough" "nursing" NRS score/VAS visual score/cancer pain score" intervention effect/influencing factors.

2.2 Inclusion and Exclusion Criteria for Literature and Data Extraction

Inclusion criteria for the study: ① The research subjects were inpatients with tumors in China who were diagnosed with cancer; ② The research reported the improved outcomes of patients' cancer pain scores under various nursing intervention measures or nursing management models; ③ The research types are cohort studies and case-control studies. Exclusion criteria: ① Literature that cannot completely extract the required data; ② The full text of the literature cannot be obtained for download. ③ Literature with a quality evaluation of "low quality". Subsequently, the researchers conducted a detailed screening based on the inclusion and exclusion criteria, and screened the literature according to the screening sequence of article summaries - outcome measures - full text - data format. And complete the data extraction of the first author, publication year, research subjects, research categories, sample size, contents of nursing intervention or cancer pain management, NRS score (mean ± standard deviation), and the evaluation results of literature quality of the included literature.

2.3 Literature Quality Evaluation

Researchers used the Newcastle-Ottawa Scale (NOS) [1] to conduct two rounds of independent quality evaluations on the literature of case-control studies and cohort studies respectively. The maximum score of the NOS scale is 9 points. The scoring criteria are as follows: a score lower than 5 is considered Low-quality literature, 5 to 6 is Medium-quality literature, and 7 to 9 is High-quality literature. This study only included the literatures with a NOS score of ≥5 points to ensure that the quality of the selected literatures achieved a qualified standard.

2.4 Technical Route

The study conducted a Meta-Analysis of the included literatures based on stata.14. If $I^2 < 50\%$ and $p > 0.05$, the heterogeneity of the meta-results was relatively small, and the fixed-effect model was selected. If $I^2 > 50\%$ and $p \leq 0.05$, it indicates that the heterogeneity of the Meta-results is relatively large. Then, a random effects model will be selected and the included literatures with greater influence will be excluded to complete the sensitivity analysis of the integrated results and explore the source of sensitivity clearly. When the number of original literatures included in the research institute more than 10, Egger's test should be conducted and a funnel plot should be drawn to evaluate the literatures' situation.

3.Result

3.1 Literature Search Results

The study obtained 4,073 literatures through preliminary literature retrieval. Based on the retrieval results, the researchers further completed the screening of article closure and extraction, obtaining 843 literatures. By deeply reviewing the full text of the literature, the researchers determined the research type and variable data format of the literature and excluded the results of 576 literatures. Meanwhile, based on the inclusion and exclusion criteria, 16 literatures were finally included and entered the meta-analysis stage.

3.2 Characteristics and quality Evaluation of Included literature

The research adopted a mode of independent double entry and double evaluation by two researchers to complete data extraction and literature quality evaluation. The contents of the inconsistent materials were confirmed after discussion. The final characteristics of the entered literature are as follows (see Table 1). A total of 16 literatures were included in the first

round of meta-integration of the research institute, involving 1,689 samples of Chinese cancer pain patients, including 845 in the intervention group and 844 in the control group. The integrated research types of the institute are mostly randomized controlled studies (RCTs, n=13), and the publication time span of the included studies is from 2014 to 2024. The research data are relatively recent.

Table 1 Summary of the characteristics of the literature included in the Meta-analysis

First author	Publication year	Research category	Type	C/T	M± SD		The core content of nursing intervention	Literature quality
					C	T		
Duan Lizhen et al. [2]	2023	Drug management	RCT	32/32	2.03±1.04	2.50±1.14	Drug titration care for the "5A" goal	Mid
Zou Junlian [3]	2020	Nursing mode	RCT	39/39	2.25±0.88	5.41±1.22	Comprehensive Nursing Management	Mid
Zhang Shufang et al. [4]	2014	Nursing mode	RCT	54/54	2.25±0.58	4.00±0.72	Comprehensive Nursing Management	High
Wang Cailian et al. [5]	2023	Psychological nursing	RCT	48/48	2.04±0.95	3.40±1.12	Mindfulness-based stress reduction therapy + Comprehensive care	High
Cui Fuli [6]	2019	Cancer pain education	RCT	55/55	2.30±0.50	4.60±1.00	Pain education + family education	Mid
Liu Zhu et al. [7]	2019	Traditional Chinese Medicine Nursing	RCT	50/50	3.62±0.28	4.11±0.35	Emotional and emotional harmony nursing combined with Lizhao Powder moxibustion	Mid
Wang Xiaohong [8]	2022	Cancer pain management	RCT	90/90	2.10±0.60	2.40±0.80	Specialized management of cancer pain	Mid
Liu Ping et al. [9]	2024	Psychological nursing	RCT	51/51	3.95±0.58	4.95±0.76	Family-style participation in dignity therapy	High
Wang Jiongqi et al. [10]	2024	Cancer pain management	NRCT	58/68	2.47±0.62	4.26±1.51	Full-process MDT cancer pain group management	Mid
Quan Xiaoting et al. [11]	2022	Traditional Chinese Medicine Nursing	RCT	120/110	3.01±0.49	5.02±0.35	Auricular point embedding + standardized management	Mid
Xue Shuzhi et al. [12]	2020	Nursing mode	MCS	50/50	2.87±0.64	3.98±0.86	Integrated nursing management of medical care	Mid
Wang Lihui et al. [13]	2022	Nursing mode	NRCT	60/60	2.45±0.53	4.12±0.74	Team working mode of cancer pain care strategy	Mid
Lu Tianyi et al. [14]	2023	Drug management	RCT	61/61	1.30±1.00	3.20±1.10	Drug treatment management services	Mid
Chen Xueling [15]	2019	Traditional Chinese Medicine Nursing	RCT	30/30	1.30±2.45	2.07±2.45	Traditional Chinese physical therapy + routine care	Mid
WeiChi Su[16]	2020	Cancer pain management	RCT	26/25	1.80±4.81	2.50±2.93	Comprehensive pain management strategy	High
Qiuling Zhao[17]	2023	Drug management	RCT	21/21	1.86±0.79	2.76±1.00	Wechat mini-program drug guidance service	High

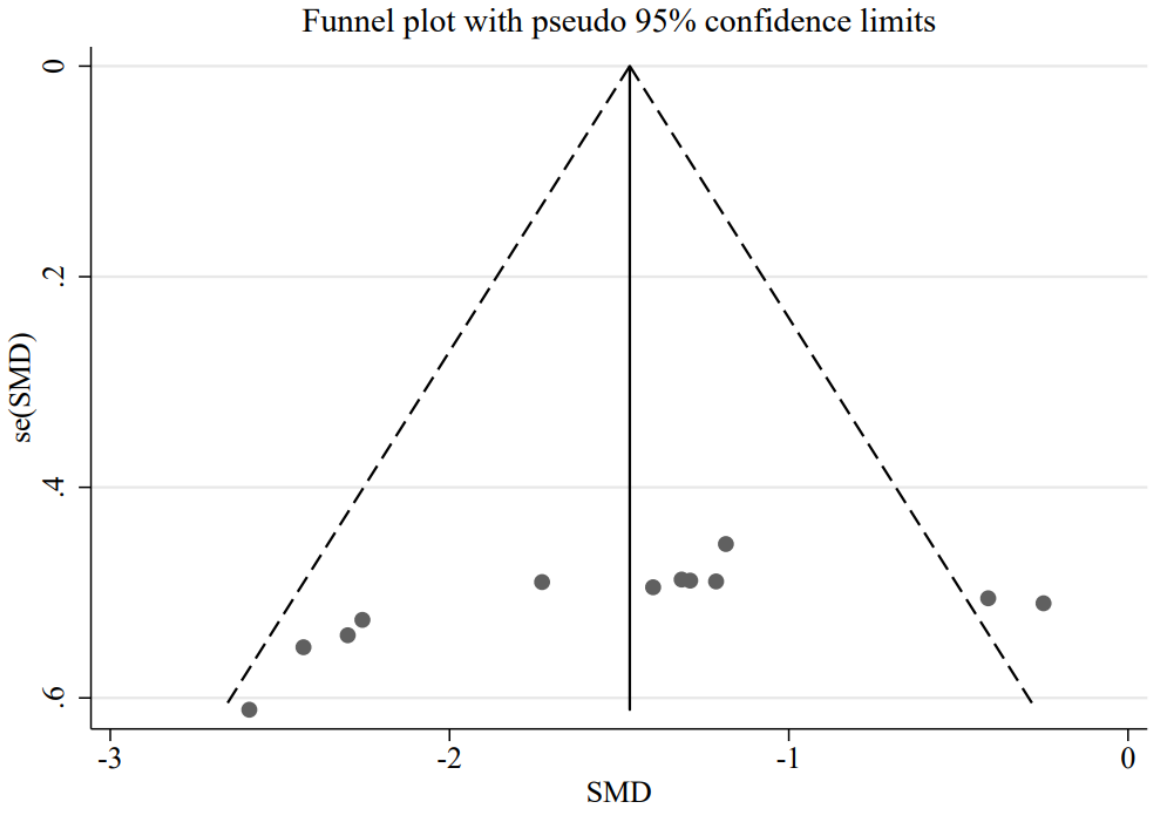
Note:RCT: Randomized Controlled study; NRCT: Non-randomized Controlled study MCS: Paired Cohort Study MDT: Multidisciplinary Medical Collaboration Model.

2.3 Meta-Analysis Results

The Standardized Mean Difference (SMD for short) of the first round of Meta integration was -1.575 (95% CI: (-2.084 to -1.066), indicating that the nursing intervention in the experimental group had a significant negative effect on the cancer pain score (NRS score), suggesting that the various reported control studies of cancer pain nursing intervention produced ideal positive results. The meta-integration results showed that I^2= 94.0% > 50% and p≤0.05, indicating that the heterogeneity of the included studies was relatively large, and the random effects model was selected. Through the random effects model, the sources of research heterogeneity were sought. After excluding the studies of Wang Xiaohong [8], Quan Xiaoting et al. [11], and WeiChi Su[16], the I^2 decreased. Subsequently, any literature was excluded, and no significant change was found in the I^2 level of the study. The meta-integration results tended to be robust.

After eliminating the literatures with high heterogeneity, a total of 12 literatures are now included for analysis. The funnel plots drawn based on stata.meta-st0012 basically show symmetry (Figure 1). Egger's test calculation results: t = -2.15, p=0.217 > 0.05, which was not statistically significant. This indicates that there was no obvious bias in the results of the meta-analysis of the included literature. The Egger test scatter plot supports this result.

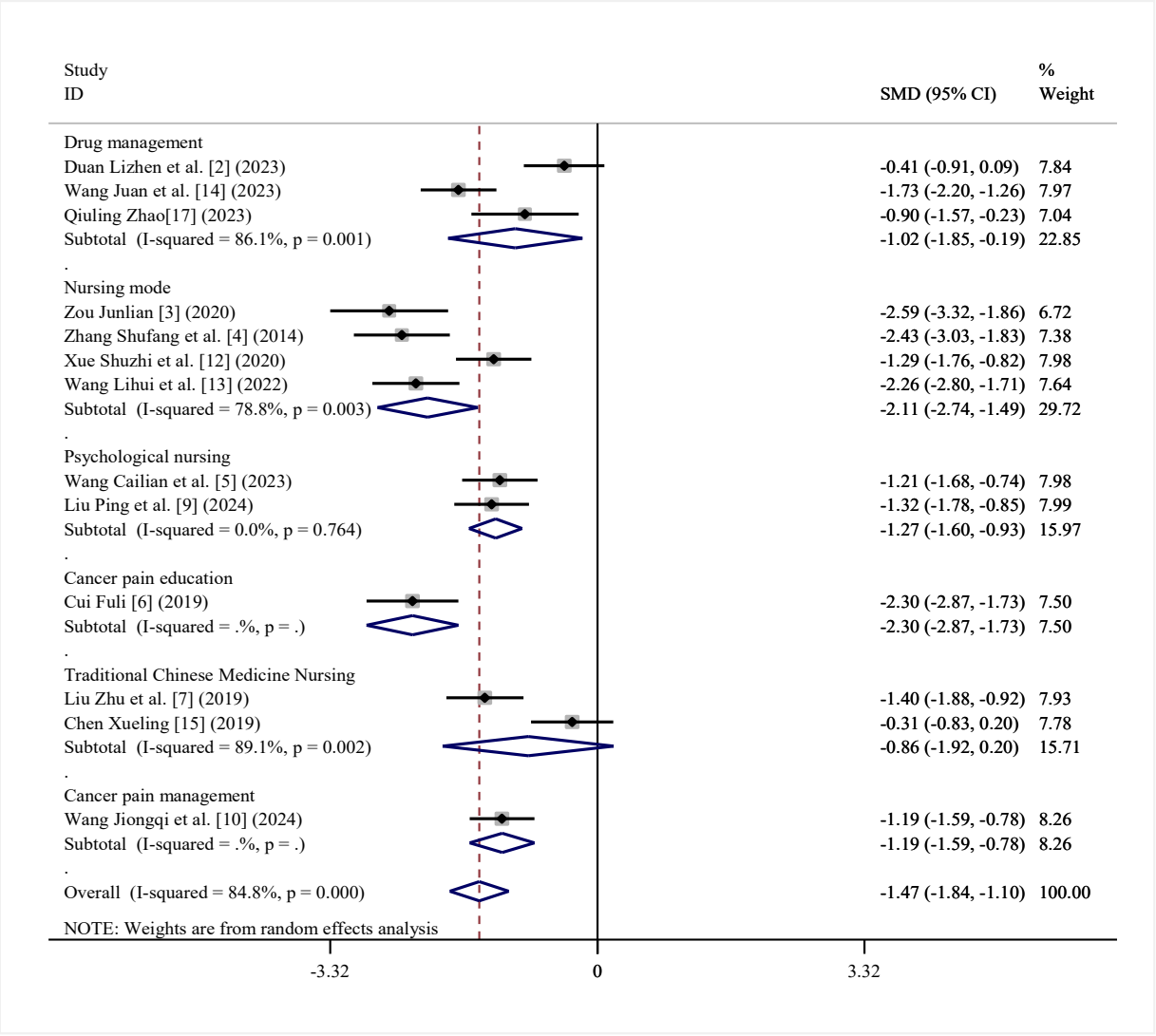
Figure 1 Meta-integrated funnel plot



2.4 Meta-subgroup analysis

Since the research aims to evaluate the intervention effects of various studies in the field of cancer pain care intervention, the heterogeneity of the integration results of the meta-subgroups of each group is at a relatively high level (I^2 > 50%). The Meta-results shown in Figure 2 indicate that the final value of the total SMD is -1.51 (95% CI: -1.90 to -1.12), indicating that research-oriented comprehensive nursing intervention has a significant control effect on the cancer pain level (NRS score) of inpatients with tumors in China. Meanwhile, in the field of cancer pain nursing intervention, the lower-level classifications of "Drug management", "Nursing mode", "Psychological nursing", "Cancer pain education", and "Cancer pain management" presented superior results in the meta-integration (see Figure 2), and the original positive conclusions in the literature [2-17] .It has proved the effectiveness of relevant nursing intervention measures and nursing management models at the level of cancer pain control management for inpatients with tumors in China.

Figure 2 Forest plot of Meta-subgroup analysis



4.Discussion

4.1 Research-oriented comprehensive nursing intervention has achieved remarkable results in cancer pain intervention for inpatients with tumors in China

The Meta-integration results showed that the SMD of the effectiveness of research-oriented comprehensive nursing intervention in cancer pain intervention for inpatients with tumors in China was -1.51 (95% CI: -1.90 to -1.12), according to Cohen's criteria (Cohen's d) : SMD =-1.51 > 0.8, indicating a significant difference compared with the control group. The clinical value is clear and there is a sufficiently large effect level to support this conclusion. The meta-study by Xu Qianqian et al. (2016) [18] reported that the reducing effect of nursing intervention on the short-term pain score of cancer pain patients from 2004 to 2013 was WMD=-0.82 , 95%CI(-1.11,-0.53), and the converted estimation result was SMD = -1.11 (95%CI: -1.50, -0.72). The SMD effect value of research-oriented comprehensive nursing intervention was lower than that of the former study, revealing the following trends: The advancement of the nursing discipline and the development of medical technology have made the cancer pain nursing intervention system for inpatients with tumors in China more mature and scientific than it was ten years ago. The literature included in this study (2014-2024) builds on the past and pges on the future in terms of nursing intervention content, and adopts more scientific and effective intervention measures as the basic routine for constructing a research-oriented comprehensive nursing intervention system. ② The medical service system and nursing intervention have achieved high-quality development. Currently, the available analgesic drugs and relief measures for cancer

outbreak pain in hospitals have made progress compared to ten years ago. Postoperative analgesic pumps for cancer patients and cancer pain management models based on integrated medical and nursing care have been widely and deeply applied, and the satisfaction of inpatients with cancer is better. The reduction of SMD within a reasonable range further supports the universality of the conclusion that comprehensive nursing intervention is effective. Therefore, combined with the original literature, the content of research-oriented comprehensive nursing intervention has considerable practicality in the field of clinical cancer pain intervention and can achieve ideal analgesic benefit outcomes, which is worthy of promotion.

4.2 The intervention effect of cancer pain in the subgroups of "Nursing mode" and "Cancer pain education" was higher than the overall level of the study

The results of the subgroups "Nursing mode" and "Cancer pain education" were SMD: -2.11(-2.74,-1.49), with a weight of 29.72%, and SMD:-2.3(-2.87,-1.73), with a weight of 7.5%, respectively. This revealed that the research-oriented comprehensive nursing intervention in this category demonstrated superior effects in the field of cancer pain intervention. It is undeniable that the results of the two subgroups demonstrated the potential for enhancing the effectiveness of specific intervention strategies. However, considering other factors, in the five studies included in the "Nursing mode" and "Cancer pain education" subgroups, each literature intervention group "added" to the routine of tumor cancer pain. For instance, the "Nursing mode" subgroup, relying on the advantages of the management mode, highlighted more frequent and diverse characteristics of nursing assessment and intervention in the intervention content. This led to the fact that in the high-frequency output and feedback mode of the nursing system, the effect of the intervention group was bound to be better than that of the conventional control group. Researchers were also unable to provide reasonable blinding to clinical nurses, thereby resulting in differences in intervention intensity between the control groups. Therefore, for the "Nursing mode" subgroup, the superimposed effect of systematic objective results and implementation bias might be the reason why this subgroup is much higher than the overall level of the study. The "Cancer pain education" subgroup is considered to reveal an enhancement mechanism - cancer pain education intervention, through the knowledge-belief-practice path, invisibly promotes the improvement of patients' self-management and self-efficacy. "Cancer pain education" forms a synergy mechanism by empowering patients and integrating with the existing systematic nursing intervention, creating the core driving force for subgroups to demonstrate superiority. Therefore, clinical nurses must attach importance to the limitations of the effectiveness of a single nursing measure and learn the profound value of the combined use of systematic cancer pain nursing intervention measures.

4.3 Bias Effects and Limitations of Research-oriented Comprehensive Nursing Intervention in Teaching Hospitals

Admittedly, the trend of "nursing research favating positive results" created by the objective research demands in teaching hospitals has already become a clear academic impression in the academic circle. In addition to what has been mentioned earlier, in research-oriented comprehensive nursing intervention, the bias effects caused by directly "adding intervention" to the routine nursing of the department and the inability to blind clinical nurses in most cases, as well as the bias at the time of literature publication caused by human factors such as case screening and sample modification, also need to be taken seriously. Among the literatures included in this study, the heterogeneity level of the same type of studies is also at a relatively high level ($I^2 > 50\%$), which indicates that the differences in the intervention data results among similar research designs are also relatively obvious. In the research-oriented clinical nursing process, patients will actively cooperate due to the perception of "being given special attention", forming the "Hawthorne effect" which leads to an inflated intervention effect. The high effect size caused by the absence of blinding methods needs to be taken seriously. The additional nursing work pressure associated with the research institute and the additional demands arising from patients' autonomous perception of the "group" and the awareness between groups have been forced to form the contradiction of "role conflict", which will bring another type of bias to the intervention outcome. This brings new challenges to the evidence-based value of the research results.

5.Outlook

Only by facing up to the utilitarian undertone of "positive preference" and deconstructing the path dependence of "additive intervention" can a balance point be found between the rigor of scientific research and the practicality of clinical practice.

Future nursing research should be “evidence growing from the bedside” rather than “hastily produced papers for the sake of papers”. This requires not only a self-revolution in methodology but also a deep awakening of academic culture - making research truly serve patients rather than being confined to journals.

Conclusion

This meta-analysis demonstrates that research-oriented comprehensive nursing interventions significantly enhance cancer pain management for hospitalized oncology patients in China, yielding clinically meaningful improvements in pain outcomes. The intervention’s efficacy is particularly amplified in subgroups employing structured “Nursing mode” frameworks and systematic “Cancer pain education” programs, where synergistic mechanisms—including standardized assessment protocols, patient empowerment through knowledge reinforcement, and integrated care delivery—collectively drive superior pain relief compared to conventional approaches.

However, implementation in teaching hospital settings reveals noteworthy methodological constraints: the inherent challenges of blinding clinical staff, intervention heterogeneity across studies, and potential inflation of effect sizes due to Hawthorne effects collectively introduce implementation bias and threaten validity. Furthermore, role conflicts arising from added nursing workloads and patients’ perception of specialized attention warrant careful consideration in real-world application. While these interventions represent an advancement over historical nursing practices, future studies should prioritize pragmatic designs that minimize artificial and design biases, standardize intensity metrics across control groups, and evaluate sustainability beyond research contexts to strengthen translational impact.

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no

Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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